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In Cooperation with the South Dakota Agricultural Experiment Station

SOIL SURVEY
OF
HYDE COUNTY, SOUTH DAKOTA

BY

J. A. MACHLIS
South Dakota Agricultural Experiment Station, in Charge
and B. H. WILLIAMS
U. S. Department of Agriculture

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SOIL SURVEY OF HYDE COUNTY, SOUTH DAKOTA

By J. A. MACHLIS, South Dakota Agricultural Experiment Station, in Charge, and B. H. WILLIAMS, U. S. Department of Agriculture

COUNTY SURVEYED

Hyde County is in the central part of South Dakota. It is nearly rectangular in outline, its longer dimension, 48 miles, extending north and south, and its shorter one, 18 miles, extending east and west. Missouri River forms the southwestern boundary. The total land area is 861 square miles or 551,040 acres.

Hyde County lies within the glaciated region of the Great Plains. The Wisconsin ice sheet covered this area, and the débris left when the ice receded affected the physiographic features of the entire county, except the southeastern part. In the northern three-fourths of the county the original constructional surface is still intact. The northern fourth of the county has a rolling surface, with some conspicuous hills and ridges. Between this region and South Medicine Creek the moraines are less distinct, the hills are low and rounded, and large areas are nearly flat.

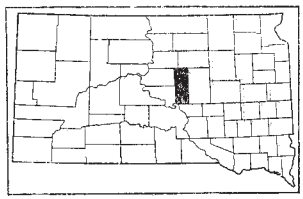

FIGURE 1.—Sketch map showing location of Hyde County, S. Dak.

Drainage has not been established over the surface of the morainic region, and numerous depressions and troughs of irregular size and shape occur between the hills and ridges. Some of these depressions are round, but the greater number are narrow valleys winding among the hills and in some places forming a network of depressions. In these areas drainage is more or less deficient, and most of the depressions are occupied by meadows or lakes. The constructional features of the landscape continue for about 10 miles south of South Medicine Creek, but the depressions gradually decrease in number. In the southern part of the drift-covered area, drainage is more fully developed and very few poorly drained areas are noticeable. The morainic hills in this part of the county are well rounded, and some are conspicuous. In Peno and Dewey Townships, many of the hills rise to a height of 100 feet above the general level of the land.

In a strip several miles wide along Missouri River, the glacial drift has been removed and the bedrock shales are exposed. Here stream channels have cut back into the shale hills, and the banks of these and their tributary drainage ways have been sharply eroded, giving the country a rough, broken appearance.

Narrow strips of low terraces or bottoms have been built up along the larger creeks. The widest bottom, which is along South Medicine Creek, ranges from one-eighth to one-half mile in width. On

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each side of this bottom is a very gently sloping or level area, known locally as the valley, which varies from one-half mile to 2 miles in width. This valley is narrow at its eastern extremity but broadens out as it follows the stream westward.

Numerous intermittent lakes or marshes are in the northern half of the county. Mitchell Lake, the largest, is in the western part of Washington Township, and Rice Lake, Spring Lake, and Rezac Lake are in the extreme northern part of the county. Ordinarily these lakes contain some water throughout the year, but in the year of this soil survey Rice Lake was the only one that did not dry up. In the spring all the small depressions or potholes are filled with water, but during the summer these become dry.

The approximate average elevation of Hyde County is 1,900 feet above sea level. The highest parts of Banner and Van Order Townships have an elevation of about 2,000 feet, Highmore of about 1,890 feet, and the west side of the county of about 1,800 feet. The south end of the county slopes toward Missouri River, which is here about 1,400 feet above sea level.

Water for domestic use is obtained either from surface wells or from artesian wells. The surface wells range in depth from 10 to 120 feet and the artesian wells from 1,200 to 1,900 feet. Along South Medicine Creek water may be obtained at a very slight depth. Highmore is supplied with water from a well 2 miles south of that town on South Medicine Creek. The well is 35 feet deep, and the water rises to within 10 feet of the surface. The water is hard but is of excellent quality. The 1921–22 report of the State engineer shows that Hyde County has 56 artesian wells, 42 of which are flowing. The average depth of the artesian wells is 1,446 feet, and the total flow is 443 gallons a minute. The artesian-water supply in the State is falling off at a rapid rate, and in Hyde County the artesian head is estimated to be dropping about 10 feet each year. The legislature has taken steps, however, to stop the waste of artesian water, thereby decreasing the rapid exhaustion of the water supply.

The State census report for 1925 gives the total population of Hyde County as 4,000. This shows an increase from 3,315 reported by the United States census in 1920. The 1925 State census report shows only one Indian resident in Hyde County. The early settlers migrating to this county from outside of the State came largely from Illinois, Iowa, and Wisconsin. The foreign-born residents are mainly Germans, Norwegians, Swedes, Bohemians, Danes, Russians, and English.

Hyde County was legally organized in 1884. Owing to lack of roads and to the hilly relief, the northwestern part of the county is sparsely populated. The agricultural population is more thickly distributed throughout the valley. The only two towns in the county are Highmore, the county seat, with a population of 1,022 in 1920, and Holabird, with a population of 75. Peno and Stephan are small settlements in which there are a store and a post office. The Immaculate Conception Indian Mission and School is in the southern part of the county.

The Chicago & North Western Railway crosses the middle of the county from east to west. This is the only railway in the county, and Highmore and Holabird are the only shipping points.

The public roads follow section lines, except in the northwestern part of the county and along the Missouri River, where, in order to avoid hills and sloughs they wind somewhat. Roads are passable during the greater part of the year. The Black and Yellow Trail, State Highway No. 30, which crosses the middle of the county from east to west, is graveled. Several county highways are graded and kept in fair condition by the use of drags after rains.

Rural mail routes serve practically all parts of the county. Most of the farmers have telephones. The farm residences and other buildings are exceptionally good. The county has an adequate number of rural schools. Highmore has a new high-school building, which offers a 4-year course of instruction. The greater part of the rural population attends church either at Highmore or Holabird.

In 1897 the State legislature passed a bill for the establishment of an experiment substation at Highmore. Owing to an amendment, however, the necessary funds to carry out this program were not appropriated at that time. In 1898, 117 acres of land were donated for the site, and the State, in cooperation with the United States Department of Agriculture, started investigations for the purpose of procuring drought-resistant forage plants and of increasing the productiveness of winter-forage plants and the natural range. The substation is now under the supervision of the agronomy department of South Dakota State College. Experiments are conducted on corn, grain, and forage crops, and on soil improvement, and the results are valuable not only to the farmers of Hyde County but to those of the entire State.

CLIMATE

The climate of Hyde County is typical of the plains region of central South Dakota. The summers are short, with hot days and cool nights, and the winters are long and often severe. The mean winter temperature is 16.2° F., and the recorded absolute minimum is −45°. The mean temperature of the summer months is 69.8°, and the absolute maximum is 108°.

The average date of the last killing frost at Highmore is May 14, and that of the first is September 27. This gives an average frost-free season of 135 days. The latest killing frost recorded is June 6, and the earliest is September 8.

The mean annual rainfall recorded is 18 inches. The heaviest precipitation takes place during the spring and summer, and the lightest during the winter. The wettest year recorded was 1920, when there were 27.31 inches of rainfall, and the driest year was 1890, when there were 10.28 inches. The year of the survey was comparatively dry, but the small grains gave a good yield and the corn, although damaged to a greater extent, was not a total loss. Some farmers obtained good yields.

Hail occasionally injures crops, but the damage is slight and is generally restricted to small areas.

In the climatic belt of which Hyde County is a part, the winters are severe but the fall of snow is very light. For this reason, the region is not generally adapted to the production of winter wheat. Although in favorable years the winter varieties produce well, as a

rule the snow covering is not sufficient to protect the wheat from winterkilling.[1]

Table 1, compiled from records of the Weather Bureau station at Highmore, gives the normal monthly, seasonal, and annual temperature and precipitation at that place. These data are fairly representative of climatic conditions in Hyde County.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Highmore*

[Elevation, 1,887 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1890)	Total amount for the wettest year (1920)	Snow, average depth
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*
December	18.9	65	−33	0.38	0.30	0.20	3.5
January	13.9	63	−45	.38	.30	.50	3.8
February	15.9	69	−41	.34	.20	.33	3.4
Winter	16.2	69	−45	1.10	.80	1.03	10.7
March	29.1	86	−26	.99	.30	1.20	5.9
April	45.3	92	2	1.82	.19	2.56	2.9
May	55.7	98	16	2.72	.83	6.04	.2
Spring	43.4	98	−26	5.53	1.32	9.80	9.0
June	66.6	105	32	3.37	6.17	7.35	.0
July	72.2	108	35	2.69	.36	3.56	.0
August	70.5	103	31	2.25	.56	2.47	.0
Summer	69.8	108	31	8.31	7.09	13.38	.0
September	62.2	106	24	1.52	.45	1.51	Trace.
October	48.8	95	−6	1.02	.32	.75	1.1
November	33.6	79	−17	.52	.30	.84	3.6
Fall	48.2	106	−17	3.06	1.07	3.10	4.7
Year	44.4	108	−45	18.00	10.28	27.31	24.4

AGRICULTURE

Hyde County is essentially an agricultural county. In the early days it was very sparsely populated. The principal industries at that time were cattle and sheep raising, and only a small quantity of grain was grown.

With the increase in population and the advent of the railroad, which improved marketing facilities, agriculture, particularly the production of cultivated crops, took an upward trend.

Tables 2 and 3, compiled from the Federal census reports, show the advance of agriculture in Hyde County.

[1] HARDIES, E. W., and HUME, A. N. WHEAT IN SOUTH DAKOTA. S. Dak. Agr. Expt. Sta. Bul. 222, 24 pp., illus. 1927.

TABLE 2.—*Acreage of important crops in Hyde County in stated years*

Crop	1889	1899	1909	1919	1924
	Acres	*Acres*	*Acres*	*Acres*	*Acres*
Corn, (harvested for grain)	5,377	2,342	7,067	9,371	20,483
Wheat	10,444	4,483	14,456	14,338	10,166
Oats	1,447	445	6,217	8,899	16,729
Rye	51		4	3,172	1,060
Barley	189	158	874	2,858	9,113
Flax	3,304	71	10,731	2,309	15,364
Timothy alone			14	35	
Clover alone				73	911
Timothy and clover mixed			20	10	15
Alfalfa		26	179	2,127	4,664
Wild hay	12,838	34,675	43,531	82,357	61,108
Potatoes	330	137	272	282	194

TABLE 3.—*Livestock on farms and ranges in Hyde County in stated years*

	1910	1920	1925
	Number	*Number*	*Number*
Horses	7,344	11,034	7,661
Mules	85	48	116
Cattle (total)	12,378	30,708	20,695
Beef cattle		28,957	
Dairy cattle		1,751	
Swine	4,458	12,630	21,415
Sheep	2,599	2,052	1,581

A study of Tables 2 and 3 shows that the agriculture of Hyde County consists mainly of the growing of grain and hay crops and the raising of cattle and hogs. Until about 1921 wheat was the most important crop grown. In 1919 the wheat acreage was 14,338 acres, and the average yield was 9.5 bushels to the acre. In 1924 the acreage was reduced to 10,166 acres. Of this total, only 150 acres were in winter wheat.

It is the opinion of farmers throughout the county that the winters are too dry and severe for growing winter wheat. Hard red spring and durum wheats are grown. With the exception of that which is saved for seed practically all the wheat is sold at the local elevators.

Corn was the grain crop second in importance until about 1920. In 1924 it ranked first, with 20,483 acres harvested for grain and an additional 6,314 acres cut for fodder. About 7,000 acres of corn were hogged off. The total acreage of corn harvested for grain was more than doubled in the years between 1919 and 1924. Practically all the corn is consumed locally by the work animals, dairy cattle, and swine. The varieties grown in Hyde County are Minnesota 13, All Dakota, Fulton Yellow Dent, Rustler White Dent, and Silver King. The yield ranges from 10 to 30 bushels to the acre.

Next to corn, oats occupy the largest acreage, with 16,729 acres and a yield of 562,613 bushels in 1924 as compared to 8,899 acres and a yield of 239,786 bushels in 1919. The earlier varieties are more popular, owing to the short growing season. The most important varieties grown are Sixty-Day, Cole, Richland, and Kherson. As with corn, practically all the oats are consumed locally as feed for the work animals. The average yield is about 35 bushels to the acre, but some farmers have reported as much as 70 bushels.

The acreage of flax varies from year to year. In 1924 the acreage was 15,364 acres and the yield was 126,996 bushels, as compared to 2,309 acres and a yield of 12,163 bushels in 1919. Flax is essentially a new-land crop in this county, although it can be grown in practical crop rotations. The selection of wilt-resistant varieties and early seeding are recommended by the State experiment station. From experiments at the Highmore substation, it is proved that April 15 is the best date for seeding. The popular varieties for Hyde County are North Dakota Resistant No. 114; Primost, (Minnesota No. 25); North Dakota Resistant No. 52; and North Dakota Resistant No. 62. The yields range from 3 to 10 bushels to the acre. As the year of this survey was rather dry, the yield was low. Practically all the flax is sold at the elevators immediately after threshing.

Very little barley was grown before 1919, but since then there has been a steady increase in the acreage. The United States census reports 2,858 acres, with a yield of 45,952 bushels, in 1919, and 9,113 acres, with a yield of 206,952 bushels, in 1924. The yield varies from 18 to 32 bushels to the acre. Most of the barley is consumed locally as feed, but some is sold at the elevators. Barley is winning popularity as an early-maturing grain crop for hogs. The Odessa, a 6-row variety, and Hannchen, a 2-row variety, are most popular.

The Federal census reports 67,222 acres in hay in 1924. Of this acreage 61,108 acres were in wild or prairie hay, 4,664 acres in alfalfa, 911 acres in clover, and the rest in other tame hay. The census shows a steady increase in the acreage of both alfalfa and clover, but particularly in that of alfalfa. The farmers who are growing either or both of these legumes realize their importance as pasturage, as seed crops, and as soil builders. Practically all the hay cut is fed to the livestock.

Some rye, emmer, and spelt are grown. The acreages are small, and the crops are used locally. The potato acreage also is small. Not enough potatoes are grown to supply the local demand, and very often potatoes are shipped in for domestic use. Very little fruit is grown. The census shows that in 1919 there were 57 bearing apple trees, 231 bearing plum and prune trees, and 10 bearing cherry trees in Hyde County.

Although corn and small grains are fast gaining in popularity, the largest income is from livestock and livestock products. The United States census report for 1920 shows that the value of all domestic animals in that year was $2,318,308. In 1919 dairy products, excluding those for home use, were valued at $94,821, and poultry and eggs produced were worth $70,929. The number of cattle increased between 1910 and 1920 but decreased between 1920 and 1925. Most of the herds are not large. The largest herd reported during the year of the survey was 1,300 Herefords, which were shipped in from Texas in the spring and turned out to pasture near Missouri River. Most of the cattle are shipped to Chicago or Sioux City as feeders. The leading breeds are Hereford and Shorthorn.

Dairying is gaining in popularity, and the number of dairy cattle is increasing. Some of the milk and milk products are consumed locally. Separators are in general use, and the cream is sold at the cream stations which represent large creameries in Sioux City, Omaha, and St. Paul.

The Federal census shows a steady increase in the number of hogs. In 1910 there were 4,458, and in 1925 the number had increased to 21,415. Since the Armour plant at Huron began operation in 1925, Huron affords the principal market for hogs from this county.

The sheep of the few permanent flocks in the county are sheared, and the wool is marketed. Poultry is raised on every farm. The industry is not of great importance, but it is a source of considerable income. The poultry and eggs are brought to the towns and are either traded for merchandise or sold to produce men.

The adaptability of the soils to certain crops is recognized only in a general way. The more hilly areas in the northern part of the county and the rough area bordering Missouri River are used for pasture and hay land. About 51.9 per cent of the farmed land of the county is improved. The Federal census reported 158,278 acres in crops and 156,410 in pasture in 1924. The farm homes in general are well built and substantial. The outbuildings are fair. The number of farms has increased from 463 in 1920 to 533 in 1925.

Labor and feed are the two largest items of farm expense. In 1919, 243 farmers reported an average expenditure of $790.57 a farm for labor. The average expenditure for feed in the same year, on the 253 farms reporting, was $509.67 a farm. Only three farmers reported an expenditure of $166.67 a farm for fertilizer. The 1925 statistics show that 335 farms were operated by owners, 1 by a manager, and 197 by tenants; whereas in 1920 there were 314 farms operated by owners, 24 by managers, and 125 by tenants. The terms of tenure vary considerably in different localities. The rents are on a share, share-cash, or cash basis.

Land values vary according to improvements, physiographic features, and location. Since 1920 few farms have changed hands and it is difficult to estimate land values. According to information obtained from the farmers, the improved land ranges in value from $25 to $75 an acre and unimproved land from $15 to $50. The United States census report for 1920 gives an average value of $39.22 an acre.

SOILS

The soils of Hyde County owe their most striking and important characteristics to their geographic position. The decrease of rainfall westward in the central part of the United States, and the corresponding decrease in soil moisture have resulted in less weathering and leaching of the soils and in the dominance of a type of vegetation that further influences soil development. The native vegetation, characteristic of regions of low rainfall, is a covering of short grasses. The organic matter accumulating through the decay of the grass roots imparts the dark color to the surface layers of all the soils of the region. The percentage of organic matter is slightly lower than in the eastern part of the State, where the heavier rainfall has favored a more luxuriant growth of grasses.

The combined effects of climate and vegetation have produced a belt of soils, extending north and south across the central part of the United States, in which the surface layers have attained the black color characteristic of well-drained mature soils. This belt includes the eastern part of South Dakota, from just east of Hyde County.

The change to a lighter color westward is very gradual, and the difference in color between the soils of Hyde County and those in the black belt is so slight that careful examination and comparison are necessary in making a separation.

In addition to the slight color change between the soils of Hyde County and those of the eastern part of the State, there are gradual changes in several other characteristics. The surface soils become shallower, leaching has not reached so great a depth, and lime is nearer the surface.

Wherever the soil-forming processes act with equal intensity over any region for a long time, they tend to bring about a uniform soil profile even though the parent materials on which they acted were of varying composition. This profile may be regarded as the normal profile of the region. The soils over the greater part of Hyde County have advanced to such a stage of maturity that they are remarkably similar in many important characteristics. Variations from the normally developed soils have been produced in some parts of the county by restricted drainage, some peculiarity in the composition of the parent material, or other agencies which retard or modify the soil-forming processes.

The normally developed soils have the following characteristic layers in common: (1) From 0 to 8 or 10 inches, a very dark grayish-brown or almost black surface layer having a single-grained or finely granular structure. In uncultivated areas the surface 1 or 2 inch layer is matted by grass roots, forming a turf. In most places the lower part of this layer is more compact and slightly heavier in texture than the upper part. (2) Below the surface layer and reaching to a depth ranging from 15 to 28 inches, dark grayish-brown material which, with depth, becomes brown and, in most places, heavier in texture and more compact than the surface soil. This material has a columnar structure in places but may be readily shattered into small clods. (3) Between depths of 20 and 35 inches, light grayish-brown or grayish-yellow material with spots and streaks of white. The material is more friable than that of the layer above and is commonly mellow and floury. It has no apparent structure and breaks into large, irregular clods. It contains a large quantity of lime carbonate and is regarded as a zone of lime accumulation. In places, the lime is segregated into masses and concretions. (4) Below the lime zone, the material consists of the slightly weathered parent rock. The color may be variegated gray or brown or it may be grayish yellow like that of the overlying layer. Specks and streaks of lime may be seen, but they are not so noticeable as in the third layer.

The profile described may be considered typical of the well-drained dark-colored soils which contain well-defined accumulations of lime carbonate. This group includes soils of the Williams and Bearden series. The Williams soils occur on the comparatively smooth uplands where the regional profile is most perfectly developed. The Bearden soils occupy high well-drained terraces where the parent material was more uniform and free from bowlders than in the upland soils. The upper layers of the Pierce and Sioux soils are similar to those in the typical profile but these soils are underlain, at a depth ranging from 12 to 24 inches, by loose porous strata of the parent material.

The Pierre soils, occurring in the southern part of the county near Missouri River, are immature soils derived from shale which lies at a slight depth. They have not developed the regional profile, not only because sufficient time has not elapsed since the parent shale was exposed to weathering but also because the shales were resistant to the soil-forming forces. The Orman soils of the terraces have weathered from the raw Pierre material washed down and redeposited by the streams. They retain many of the Pierre characteristics and appear to be immature.

Soils occurring in areas of more restricted drainage, such as prevailed in the upland depressions and on flat terraces, have also developed distinct profiles. The surface soils are nearly black, and the subsoils are gray or mottled and are highly calcareous and heavy textured. Soils of this kind have been grouped in the Fargo series.

The soils of Hyde County have been grouped into series on the basis of color, structure, and other characteristics. Attention is given to the source and character of the parent material and to the processes by which the parent materials were accumulated. Under each series, the soils have been separated into types on the basis of the texture of the surface soils.

The upland soils of this county, except in a small area in the southern part, have been derived entirely from material deposited by the Wisconsin ice sheet during the Pleistocene period. Carrying with it large masses of rock débris and mixing with this heterogeneous mass sandstone and shale of local formation, this ice sheet in its southern course deposited the mixed mass on a more or less smooth surface. Later the various soil-forming agencies produced uniformity in the soils, and subsequent erosion changed somewhat the original physiographic features of the country.

The Williams soils, which cover the greater part of Hyde County, have in general the typical regional profile. The surface layers are very dark grayish brown and range in thickness from 7 to 12 inches. The next lower layers are dark grayish brown or brown and are slightly heavier than the surface soils. Between average depths of about 20 and 40 inches is grayish-yellow highly calcareous material. This is underlain by the grayish-brown or grayish-yellow calcareous glacial drift parent material. The loam, with a shallow phase, silt loam, and silty clay loam of the Williams series have been mapped in Hyde County.

The soils of the Pierre series occur in the southern part of the county where drab or slate-colored shale formations are exposed to weathering. The surface soils are dark olive brown, are heavy in texture. and are sticky when wet. The subsoils are lighter in color, being light olive brown. A lime accumulation may be seen in places, but it is not generally well developed. On flat, uneroded areas, the disintegrated shale occurs below a depth varying from 5 to 8 feet. Pierre clay, with a rough phase, has been mapped.

The surface layers of the Pierce soils are dark grayish brown. They range in thickness from 4 to 12 inches but average about 7 inches. The lower part of the subsoils consists of stratified sand and gravel. The layer between the dark-colored surface soils and the gravelly subsoils varies greatly in texture and composition. In most places it is brown or light grayish-brown gravelly loam containing a large quantity of lime. The usual range in thickness of this layer

is from 5 to 10 inches. The Pierce soils occur on morainic hills. The surface is rolling, and drainage is excessive. Pierce loam has been mapped in this county.

The Bearden soils, which occur on terraces, have a profile similar in most respects to that of the Williams soils on the uplands. The surface soils are very dark grayish brown and are friable. The next lower layer is brown and slightly heavier than the surface soils. This is underlain by a grayish-yellow highly calcareous layer, which is the zone of lime accumulation. Below this is the parent material which in most places is friable calcareous loam. No bowlders occur in this soil, and very few gravel are present. The Bearden soils have developed over old water-laid deposits under good drainage conditions. Bearden silt loam and Bearden fine sandy loam have been mapped.

The Fargo soils have dark-brown or black surface soils and heavier brown, dark-drab, dark-gray, or mottled subsoils. These soils occur on terraces or in shallow depressions. They have been developed over reworked glacial till under conditions of poor drainage. Lime may be present near the surface, but it is everywhere abundant in the subsoils. Areas of Fargo soils have a flat surface, and natural drainage is somewhat deficient. Fargo silty clay and Fargo silt loam have been mapped.

The soils of the Orman series occur on terraces and outwash plains within or bordering shale exposures. These soils have developed on alluvial or stream deposits, which consist largely of sediments washed down from areas of the Pierce soils. The surface soils are dark grayish brown or dark olive brown. The subsoils are olive brown or olive drab and are heavier in texture and more impervious than the surface soils. Orman clay, with a bottom phase, has been mapped.

The Sioux soils have dark-colored surface layers which are underlain by brown materials, as heavy or heavier in texture than the surface soils. At a depth varying from 12 to 20 inches these finer-textured layers are underlain by beds of stratified sand and gravel. Areas of the Sioux soils are flat or gently sloping and occur on outwash plains or stream terraces. These soils are more or less droughty, depending on the depth to gravel. Sioux loam has been mapped.

The distribution of the soils is shown on the soil map which accompanies this report. The various soils are described in full, and their agricultural importance is discusssed. Their acreage and proportionate extent are given in Table 4.

TABLE 4.—*Acreage and proportionate extent of the soils mapped in Hyde County, S. Dak.*

Type of soil	Acres	Per cent	Type of soil	Acres	Per cent
Williams loam	221,824	55.4	Fargo silt loam	28,416	5.1
Shallow phase	83,392		Fargo silty clay	18,880	3.4
Williams silt loam	114,688	20.8	Orman clay	8,448	2.0
Williams silty clay loam	34,688	6.3	Bottom phase	2,496	
Bearden silt loam	2,880	.5	Pierce loam	10,560	1.9
Bearden fine sandy loam	256	.1	Sioux loam	704	.1
Pierre clay	13,568	4.4	Total	551,040	
Rough phase	10,240				

WILLIAMS LOAM

The surface soil of Williams loam, to a depth ranging from 7 to 12 inches and averaging about 8 inches, consists of loose, friable very dark grayish-brown or nearly black loam of finely granular structure. The surface soil is underlain, to a depth varying from 16 to 20 inches, by dark-brown or brown, heavier-textured loam or clay loam which contains some glacial pebbles. The next layer, which reaches a depth of about 30 inches, is friable or slightly compact yellow or grayish-yellow silty clay or clay loam. It is highly calcareous, containing an abundance of lime in streaks and concretions. Some specks of orange or reddish-brown iron oxide may be present in places. Below this layer is pale-yellow or yellow friable silt, the glacial till from which this soil was derived. This material is uniformly calcareous, but the lime streaks are not so abundant as in the layer above. A few iron-oxide stains are present. The color of the surface soil is rather uniform throughout the county. However, in cultivated fields the surface soil presents a somewhat lighter color than in the virgin prairie.

Glacial bowlders of various sizes occur on the surface, and in some areas these rocks are sufficiently numerous to interfere with cultivation. Very few large bowlders are present, but small stone and shale fragments are common, particularly in the less-weathered till.

Williams loam is by far the most extensive soil in the county and with its shallow phase is the dominant soil in the northern half. The soil is most typically developed in a belt about 20 miles wide, extending east and west across the county just north of the center.

Areas of Williams loam range from almost flat to rolling. Over the greater part of this soil the surface is broken only by shallow drainage ways and depressions. In the western half of section 8 and the eastern half of section 7, T. 113 N., R. 73 W., and in the eastern half of Van Order Township, particularly along Elm Creek, the surface is rather hilly and rocky.

Within areas of Williams loam are large numbers of depressions. These vary greatly in size and degree of indentation, some having well-defined shore lines while others grade imperceptibly into the surrounding upland. Where these areas are of sufficient size to be shown on the soil map they have been mapped with other soils, mainly the Fargo.

Williams loam is adapted to all the principal crops grown in the county, and yields about equal the average for the county. Climatic conditions influence the wheat yields more than differences in soils. Years of almost total crop failure are followed by years of high production in which the yield is 25 or more bushels. By following the best farming systems and selecting the most productive varieties, averages of about 18 bushels of spring wheat to the acre and of about 21 bushels of durum wheat are obtained. The acre yield of oats under the most favorable conditions is about 45 bushels, but on this soil the average is probably nearer 35 bushels. Corn yields from 10 to 30 bushels to the acre.

In the older and more thickly settled areas in Highmore, Bramhall, Holabird, and other townships near the railroad this soil is

classed with the highest-priced land in the county. According to data gathered from farmers and real-estate men, improved land at present ranges in price from $50 to $75 an acre, depending on conditions of improvement and on location, and unimproved land commands from $30 to $50 an acre. With the exception of the rough and rocky areas practically all of this soil is tillable. However, owing to the sparsity of the population, it is not all under cultivation. The natural grass vegetation on this soil is good and, where the land is not pastured or cropped, this is cut for hay.

Williams loam, shallow phase.—The difference between Williams loam, shallow phase, and typical Williams loam is that the surface soil is shallower, the subsurface or lime layer lighter in color, and the relief in general more hilly. The surface soil is dark grayish-brown or very dark grayish-brown friable, finely granular loam, varying in thickness from 2 to 6 inches. This layer is underlain by gray or yellowish-gray silt or silty clay loam which has a coarse cloddy structure where exposed in cuts, but which breaks down readily to a loose, mellow condition. This layer contains an abundance of lime, which accounts for its light color. Glacial pebbles and iron-oxide stains are also present. This layer varies from 20 to 24 inches in depth and does not contain so much lime in the lower part as in the upper. In some places borings show, between this light-colored calcareous layer and the surface soil, a grayish-brown, slightly compact, noncalcareous layer, about 4 inches thick. In cultivated fields, however, this layer is mixed with the surface soil in plowing. Below the concentrated lime layer is yellow or yellowish-gray, friable, almost floury, highly calcareous loam. The lime, though not so evident as in the layer above, is present in small masses and concretions. This layer also contains glacial till and iron-oxide stains. Glacial bowlders and pebbles may be found over the surface and throughout the soil, particularly below the 2-foot depth. On the lower slopes, the surface soil is thicker and darker in color than typical.

The largest and most typical area of this shallow soil is in the northern part of the county. A few small areas have been mapped in Valley, Loomis, Douglas, Lincoln, Holabird, Chapelle, Washington, William Hamilton, Van Order, Peno, and Convent Townships. Areas are more hilly than areas of typical Williams loam, and surface drainage is good.

This soil is practically all utilized for hay and pasture land. A large percentage of it is tillable, but owing to the sparse population of this part of the county and to the distance from the railroad, not much of it is under cultivation. This soil is classed with the cheaper lands of the county. Prairie grass, which affords good pasturage and hay, grows abundantly.

WILLIAMS SILT LOAM

The surface soil of Williams silt loam is very dark grayish-brown or almost black silt loam, ranging in thickness from 9 to 16 inches and averaging about 7 inches. It is underlain by dark-brown or brown heavier friable silt loam whch continues to a depth varying from 16 to 24 inches. The next lower layer consists of grayish-yellow or grayish-brown friable silt loam. This material contains an abun-

dance of lime, which in many places is segregated into white spots, streaks, or concretions. This is the zone of lime accumulation and is everywhere present, though in some places it is not distinctly developed. Underlying this layer is the glacial drift from which the soil has developed. It consists of grayish-yellow or grayish-brown silt loam or silty clay loam slightly lighter in color than the overlying layer. The material is highly calcareous but apparently is less calcareous than the zone of lime accumulation, as there is no apparent concentration and the lime is not so noticeably segregated. This material varies considerably in composition and appearance. It may be variegated with brown, gray, and yellow, owing to the many varieties of rock fragments occurring in the parent drift, or it may have a solid grayish-yellow color. In many places the heavier intermediate layer below the surface soil is absent and the dark-colored surface soil rests on grayish-yellow, friable, calcareous material which shows no change in color or texture where it gives way to the parent material. Glacial pebbles and bowlders are scattered over the surface and embedded in all layers of the soil and in the underlying parent drift. These coarser materials, however, are less abundant than in Williams loam.

With the exception of a few small areas in the northern part, Williams silt loam occurs in the southern half of the county, south of South Medicine Creek. Here it occupies large, uniform areas of flat or gently rolling uplands. Unlike Williams loam, very few poorly drained depressions occur within areas of this soil.

This soil is productive, and most of it is under cultivation, particularly areas near the railroad. It is adapted to all the crops grown in this region. The texture of the surface soil and the mellow subsoil make it a desirable corn soil, and it is probable that a larger proportion of corn will be grown in the future. The yields of wheat and oats compare favorably with those obtained on the better areas of Williams loam.

Near the railroad and in thickly populated areas this land is equal in value to the highest-priced land in the county.

WILLIAMS SILTY CLAY LOAM

The surface soil of Williams silty clay loam is very dark grayish brown or almost black heavy silt loam or silty clay loam about 5 inches thick. Below this layer there is in most places a grayish-yellow heavy silt loam or silty clay loam layer which is slightly heavier than the surface soil. Lime, either in finely disseminated form or in concretions, is abundant. This layer, which is present in most areas of Williams silty clay loam, ranges in thickness from 4 to 24 inches. Below it and continuing to a depth varying from 36 to 42 inches is dark olive-brown or olive-gray clay. This material has no definite structure and breaks up into coarse clods. Lime is abundant but is apparently less abundant and less segregated than in the layer above. Small partly weathered rock fragments, mainly shale, are abundant. The next lower layer, which reaches an average depth of about 54 inches, is olive-brown clay, discolored by faint streaks of lime and iron-oxide stains. The shale fragments are more abundant than in the overlying layer and are less weathered. This subsoil material is similar to that of the subsoil of the Pierre soils

Underlying this layer is the slightly weathered shale, which appears to have been broken up and moved a short distance by the ice. This soil owes its heavier texture and the olive-brown color of the subsoil to the large amount of shale in the parent drift.

Williams silty clay loam occupies several large, irregular-shaped areas in the southern part of the county. The largest area, which is in the southeastern part, covers a large part of the county that drains southeastward through Elm Creek. The area next in size lies along the Missouri River slope bordering the Pierre soils.

The surface of this soil is rolling or hilly. Small drainage ways ramify and penetrate all parts of the areas. Along the Missouri River slope, in the southwestern part of the county, the surface has been cut by deep, short stream channels, and here the entire area of this soil is rough and broken.

Only a very small acreage of this soil is under cultivation. The heavy texture of the surface soil makes it less desirable than the loam and silt loam members of the Williams series. The slow agricultural development of this soil is not owing entirely to the character of the soil. The areas are located at unfavorable distances from the railroad, and part of the soil is included in an Indian reservation. The roughest areas are used only for pastures, but from some of the smoother ones hay is cut.

BEARDEN SILT LOAM

Bearden silt loam has a very dark grayish-brown or almost black surface soil of friable, finely granular, noncalcareous silt loam, from 7 to 14 inches thick. To a depth ranging from 17 to 20 inches the dark surface layer is underlain by lighter-brown, heavier-textured material which also is noncalcareous and which is of a cloddy structure. This layer, to a depth of about 28 inches, is underlain by buff-brown or yellowish-brown heavy calcareous silt loam containing a few lime streaks and concretions. The next layer is yellow or light grayish-yellow very friable silt loam with a high lime content, the lime occurring in streaks and concretions.

The surface of this soil is level or very gently undulating, and both surface and internal drainage are good. The total area of Bearden silt loam is small, but practically all the land is under cultivation. It is classed with the higher-priced land of the county. The largest area is north of Mitchell Lake in Washington Township. Other areas are in Illinois, Loomis, Holabird, and Bramhall Townships.

The small area of this soil mapped in sections 9 and 10 of William Hamilton Township is slightly heavier textured throughout but otherwise is similar to typical Bearden silt loam. This area lies somewhat lower and, as mapped, includes some small spots of the Fargo soils.

BEARDEN FINE SANDY LOAM

The surface soil of Bearden fine sandy loam consists of very dark grayish-brown or almost black single-grained, noncalcareous fine sandy loam, from 10 to 16 inches thick. This layer grades into light-brown or yellowish-brown material of the same texture but of high lime content. The lime occurs both in masses and concretions. At an average depth of about 26 inches and continuing below the 40-inch

depth, is a layer of yellow or grayish-yellow, very friable, finely granular or single-grained very fine sandy loam which contains a larger accumulation or concentration of lime than does the overlying layer.

Only one area of this soil occurs in Hyde County. It is in the northwestern part of Washington Township. The surface is level or very gently undulating. During the year of the survey, the entire area was in crops and supported a good growth of small grain and corn.

PIERRE CLAY

The surface soil of Pierre clay is dark grayish-brown or dark olive-brown clay, about 7 inches thick. The slaty or olive color is a characteristic of this soil. When wet, the soil is extremely sticky, but when dry it breaks up into small clods. If worked when too wet it becomes very hard and refractory. The soil is not acid, but not enough lime is present to effervesce when acid is applied. Underlying the surface soil and continuing to a depth ranging from 20 to 30 inches is olive-brown heavy clay which is discolored, in many places, by iron stains or by white specks of lime. As a rule this material does not effervesce with hydrochloric acid unless the acid comes in contact with the lime particles. No sharp line of demarcation separates this layer from the surface soil, but the change to a lighter color and a heavier texture is gradual. The next lower layer is heavy clay of similar or very slightly lighter color. Lime is abundant as streaks and concretions. Iron stains and concretions are also present. The material of this layer passes gradually into partly weathered shale and, at a depth varying from 5 to 8 feet, is underlain by the bedded shale from which the soil has weathered.

Pierre clay occurs only in the southern part of the county, south and west of West Fork Elm Creek, where it covers a continuous area of 21.2 square miles. The surface is undulating or rolling, and surface drainage is good. The greater part of the area is uncultivated and is used for pasture and hay land. Where crops are grown, small grains predominate. The soil is heavy and must be worked only under optimum moisture conditions. For this reason this is a less desirable soil than members of the Williams series.

Pierre clay, rough phase.—The surface soil of Pierre clay, rough phase, is olive-brown clay. It is lighter in color and heavier in texture than that of typical Pierre clay. Most of the true surface soil has been washed off, and the less-weathered material is near the surface and in many places is exposed. Bedded shale also outcrops. The weathered soil changes little either in color or texture. Iron concretions are abundant throughout this soil, and in places are scattered over the surface. On some eroded knolls they cover the surface, giving it a black appearance when viewed from a distance.

The surface of this soil is rough, the entire area being badly eroded and cut by deep narrow gorges. The principal area of this soil occurs in the southwestern part of the county where it rises abruptly from Missouri River and its flood plain. Three smaller areas lie along the valleys of small drainage ways in the southwestern part of the county.

Vegetation is sparse over the greater part of this rough soil and where badly eroded the knolls and slopes are bare, except for scattered cactus and yucca plants. The less-eroded land is used as pasture in conjunction with the better land of the creek valleys.

FARGO SILT LOAM

The surface soil of Fargo silt loam, to an average depth of 7 inches, is very dark grayish-brown or black friable silt loam. On close examination a laminated or small platy structure may be seen in many places. Under cultivation this structure is destroyed, and the soil becames loose and friable. Underlying this surface soil is a layer, varying from 8 to 18 inches in thickness, which consists of dark-gray or black, coarsely granular, heavy noncalcareous silty clay or clay. When dry this material breaks into short irregular columns. The next layer is dark-gray or light brownish-gray clay which in many places is mottled with light gray. This layer contains an accumulation of lime, which appears both in masses and in streaks. When dry it also shows some columnar breakage, in which the columns range from 2 to 4 inches in height and are not well defined. Here and there a small number of rounded gravel are present. This layer continues to an average depth of about 35 inches, where it is underlain by gray or light grayish-brown, somewhat friable material in which there is a large accumulation of lime in masses and concretions. In this layer a few rounded gravel are also found.

This soil occurs in a great number of comparatively small areas scattered over all parts of the county except the extreme southern end. In the glaciated region the valleys dammed or inclosed by the glacial débris have been filled by sediment, and on this the Fargo soils have developed. Fargo silt loam has also developed on the flat terraces where drainage is not so restricted as in areas of Fargo silty clay. One area of this soil borders South Medicine Creek almost across the county. A few other areas occurring in depressions are more than a square mile in extent. The greater number of the areas are much smaller and many, which are too small to indicate on the soil map, have been mapped with the Williams soils. Most of the Fargo silt loam can be farmed, and wherever cropped it gives good yields. In wet seasons, however, crops are likely to drown out, so that late in the growing season these Fargo silt loam areas are conspicuous by their bareness.

South of Holabird for about 2 miles east and west along South Medicine Creek, an area of Fargo silt loam differs somewhat from typical in that a slight accumulation of alkali salts occurs in the surface layer and numerous small alkali spots are seen on the surface. Here the intermediate subsurface layer is lacking, and the surface layer passes directly into yellow or brownish-yellow mottled sticky clay at a depth of about 8 inches. This soil was included with Fargo silt loam in mapping.

FARGO SILTY CLAY

The surface soil of Fargo silty clay, to a depth ranging from 6 to 10 inches, is very dark grayish-brown, noncalcareous, rather heavy, cloddy silty clay. In virgin areas, where this soil is covered with

water for a great length of time and then becomes dry, a thin gray layer has developed immediately below the sod. This layer is completely obliterated in the process of cultivation. The surface of cultivated fields appears gray in many places where water has stood, and it is believed that this gray layer is caused by the concentration of alkali salts. Below the surface soil and continuing to a depth of about 30 inches is black, heavy, compact, impervious clay which is low in lime content. This layer is underlain by dark-gray or dark-brown material which is lighter textured and not so compact as either of the above layers. This material contains an accumulation of salts and lime and effervesces readily with hydrochloric acid. Below a depth of 40 inches the soil becomes browner and more mottled.

The surface of this soil is flat, in most places depressed, and drainage is poor. In wet seasons the small depressions hold water. The larger and flatter areas are cultivated to some extent, but even these are utilized chiefly for hay and pasture land, as water stands on them during the spring. There are no extensive areas of this soil, the largest areas occurring in Washington, William Hamilton, and Eden Townships. Small areas are scattered over the entire county, except in the extreme southern part, but are more numerous in the northern half in the morainic hills where drainage has not developed in many of the depressions.

ORMAN CLAY

The surface soil of Orman clay, to an average depth of 10 inches, is dark olive-brown heavy clay. It becomes very sticky when wet and refractory when dry, breaking up into coarse clods. Simple tests did not show the presence of lime. The next layer, which continues to a depth of about 18 inches, is lighter in color than the surface soil and is of about the same texture but is more compact. Here and there throughout this layer specks of lime are present, but the lime is not disseminated. This layer is transitional between the surface soil and the subsoil of grayish-brown or olive-gray plastic clay containing an accumulation of lime and alkali salts. Iron-oxide stains occur in many places in this layer. At a depth of about 24 or 26 inches the subsoil grades into gray or light-gray clay which is less plastic and less compact than the overlying layers. It is somewhat friable when dry, is highly calcareous, and contains lime concretions. Iron-oxide stains are also common.

In some borings this layer is lighter-textured looser material than typical. Here and there quartz gravel of various sizes, presumably the outwash from the surrounding uplands, occur on the surface and less abundantly throughout the soil. This soil has many of the characteristics of Pierre clay, the parent material being reworked from Pierre clay or shale areas and deposited by water.

Orman clay covers an area of 13.2 square miles in the southern part of the county. It occurs on terraces and colluvial slopes near shale exposures. On account of its heavy texture and plastic consistence, it is more difficult to work than the upland loam and silt loam soils. It is possible, however, to cultivate it, except in very wet seasons, without serious difficulty. The land supports a heavy growth of native grasses and is used for hay and pasture land.

Orman clay, bottom phase.—Soil of this phase is very similar in texture to typical Orman clay. It is dark olive-brown clay to a depth of about 14 inches, where it grades into grayish olive-brown or light olive-brown highly calcareous clay. The lime in this lower layer appears in streaks and concretions. The texture is somewhat heavier than that of the surface soil and the material is more compact and cloddy.

Where this soil is mapped south and west of Stephan and in the creek bottom in the western part of T. 109 N., R. 71 W., and the southeastern part of T. 110 N., R. 72 W., layers of gravel appear at irregular intervals. These layers vary in thickness from a few inches to 1½ feet and are found at various depths throughout the soil. With the exception of these gravelly pockets the soil is similar to Orman clay, bottom phase.

The bottom phase of Orman clay occurs only in the southeastern part of the county in creek bottoms either within or near areas of Pierre clay. A thick mat of native grasses covers this land, and the entire area is utilized for pasture and hay land.

PIERCE LOAM

The surface soil of Pierce loam, to an average depth of about 7 inches, is dark grayish-brown or almost black loose friable loam containing some pebbles on the surface and throughout the soil. This layer is underlain, to a depth varying from 12 to 20 inches, by gray or light grayish-brown gravelly loam with a high content of lime occurring in masses and concretions. This highly calcareous layer varies in thickness and in depth from the surface. The next lower layer consists of rounded and weatherworn brown gravel of various sizes. This gravel is generally stratified or cross-bedded.

The surface is hilly and surface drainage is good, but owing to the openness or porosity of the subsoil, subsurface drainage is excessive and the soil as a whole is subject to drought. The largest area of this soil is in the northwestern part of the county in Franklin, Union, and Spring Lake Townships. Smaller areas are mapped throughout the county. Most of the land is morainal, occurring adjacent to swamps, lakes, or creeks. Not much of it is cultivated, but practically all of it is used for pasture and hay land.

In the areas of Pierce loam mapped in sections 5 and 6, T. 114 N., R. 71 W., the subsoil is sandy or coarsely sandy for about 3 or 4 feet above the gravel layer. These particular areas are more retentive of moisture and are considered better land than typical Pierce loam. Since there were only two small areas of this kind in the county, no separation was made and they were included with Pierce loam in mapping.

A small area of Pierce loam occurring in the southwest corner of section 2 and the southeast corner of section 3, T. 115 N., R. 73 W., is rather flat and lies much lower than the surrounding area of Pierce loam. The gravel in this area lies at a depth ranging from 2 to 4 inches below the surface. The gravel is not uniformly stratified, and the individual pieces are round and coated with lime. During the year of this survey this area supported an excellent growth of alfalfa. Here there was no indication of drought, so characteristic of this soil, owing presumably to the deep feeding

power of the alfalfa roots and also to the proximity of the water table to the surface, since the level of this particular area was not far above that of the slough adjoining it.

SIOUX LOAM

The surface soil of Sioux loam is very dark grayish-brown or almost black friable, noncalcareous loam varying from 10 to 14 inches in thickness. Underlying this is a gray mixture of silt, sand, fine gravel, and clay with an abundance of lime, which occurs in masses and concretions. Nearly every pebble in this layer is coated with lime. This layer varies in thickness from a few inches to a foot and continues to a depth ranging from 12 to 24 inches. The next horizon consists of uniformly stratified and varicolored sands and gravels and is more or less open and porous. In seasons of light rainfall this soil is so droughty that crops are seriously injured.

Sioux loam is very inextensive in Hyde County. The largest areas are on South Medicine Creek in Highmore and Bramhall Townships. Some gravel pits have been opened on this soil, and the material is used for road construction and other purposes. Aside from such usage the land has no value.

SUMMARY

Hyde County is near the center of South Dakota. The southwest corner borders Missouri River. The county is 18 miles wide, 48 miles long, and has a total land area of 861 square miles or 551,040 acres.

The approximate elevation is 1,900 feet above sea level. The county lies within the glaciated region of the Great Plains and has the typical swell and sag relief of nearly all glaciated regions. The surface in general is level or gently rolling. Morainic hills are conspicuous in the northern and southeastern parts.

Small creeks drain the southern half of the county toward the southeast and west. In the northern half of the county drainage has not been well established over all the upland, and a great number of small, rounded depressions and winding valleys are poorly drained. Several lakes or sloughs occur in the northern part of the county.

Hyde County was legally organized in 1884. The total population of the county, according to the 1920 United States census, was 3,315, all classed as rural.

Highmore is the largest town and the county seat. It has a public school and a high school. Holabird is the only other incorporated town in the county.

The temperature and rainfall data were taken from observations made at the United States Weather Bureau station at Highmore. The absolute extremes in temperature are 108° F. and −45°, and the annual mean is 44.4°. The mean annual rainfall is 18 inches, with 27.31 inches, in 1920, recorded as the highest and 10.28 inches, in 1890, as the lowest.

Agriculture is the chief source of income in the county. Corn and grain production and the raising of livestock are the important industries. At present corn occupies the largest acreage, with wheat and oats following in the order named. Barley, flax, and hay are

grown. Practically all the grain, with the exception of wheat and flax, is fed to livestock.

The livestock industry includes the raising of cattle and hogs. Dairying, although increasing in importance, is at present carried on in a small way.

The soils of Hyde County have developed over glacial drift, a dark-colored shale, and alluvial deposits consisting of sediments derived from the two other materials.

The Williams soils are the most extensive and important in the county. Natural drainage on them is good, and they give good yields of crops commonly grown in the county. The Bearden soils differ from the Williams to no great extent.

Other soils in the county are grouped in the Pierre, Pierce, Fargo, Sioux, and Orman series.

○

[PUBLIC RESOLUTION—No. 9]

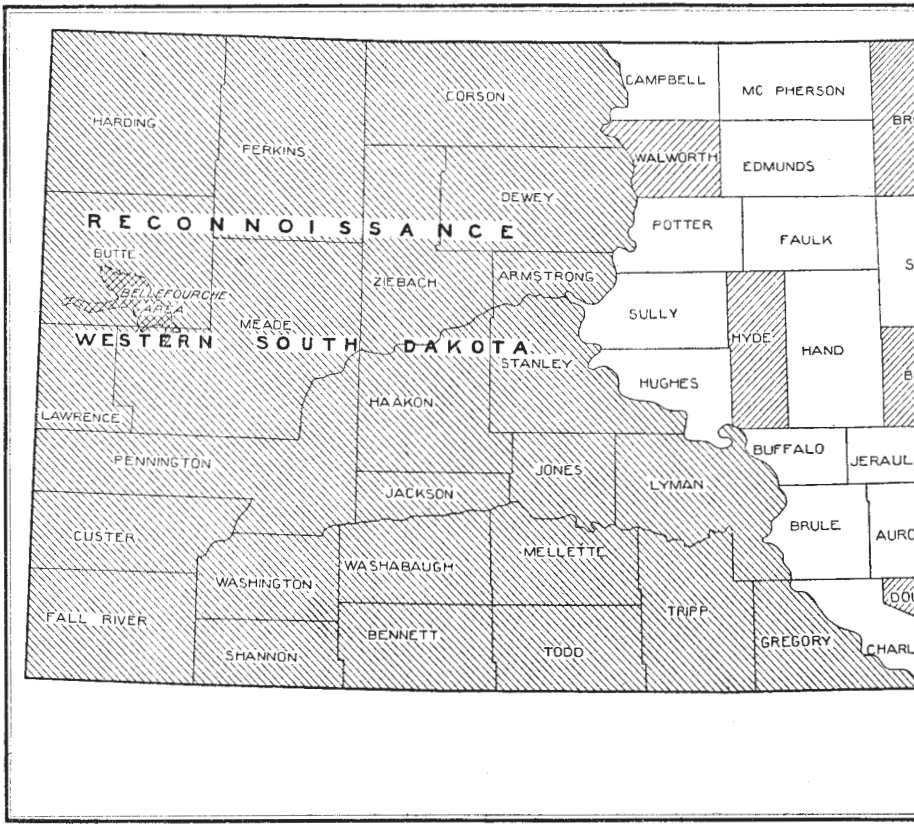
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils, and on July 1, 1927, the Bureau of Soils became a unit of the Bureau of Chemistry and Soils.]



Areas surveyed in South Dakota shown by shading

U. S. GOVERNMENT PRINTING OFFICE: 1930

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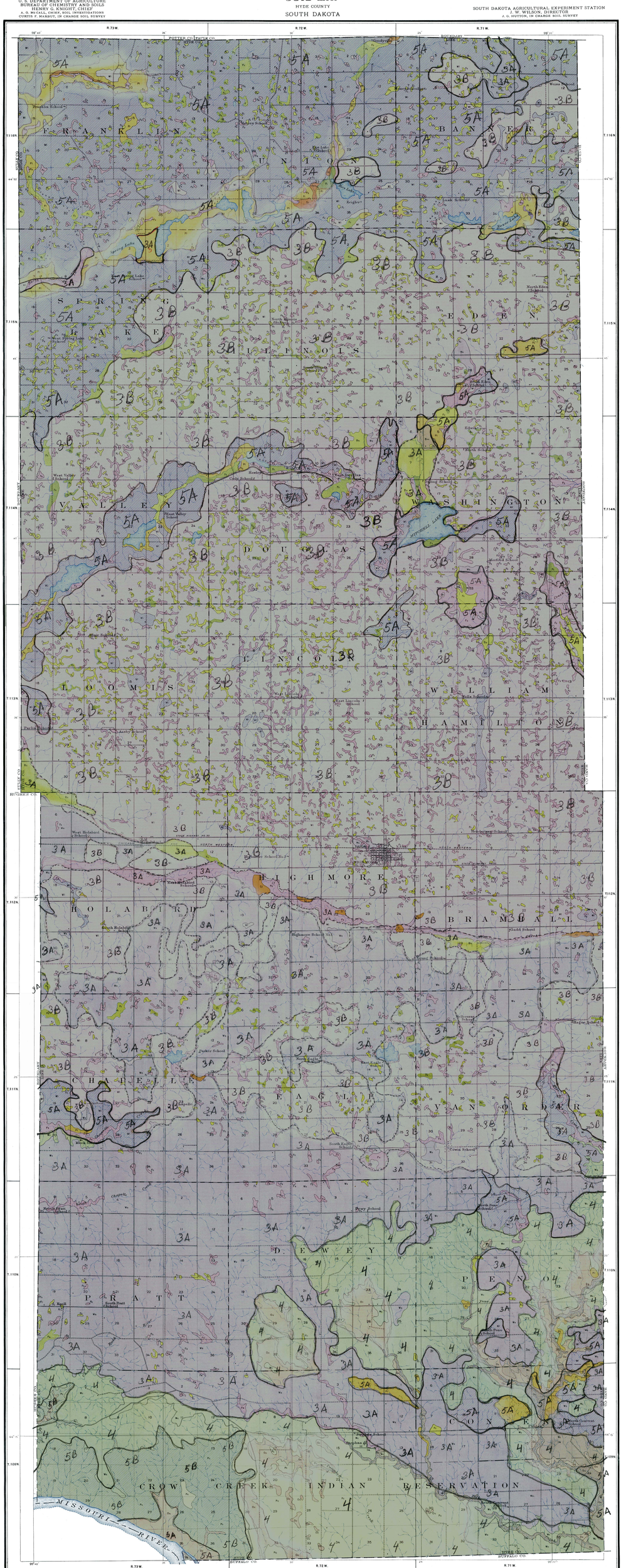
A. G. McCALL, IN CHARGE SOIL INVESTIGATIONS
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP

HYDE COUNTY

SOUTH DAKOTA

SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION
J. W. WILSON, DIRECTOR
J. G. HUTTON, IN CHARGE SOIL SURVEY



LEGEND

Bearden fine sandy loam — Bm	Pierre clay — Pc
Bearden silt loam — Bs	Pc Rough phase
Fargo silt loam — Fs	Sioux loam — Si
Fargo silty clay — Fc	Williams loam — Wl
Orman clay — Oc	Wl Shallow phase
Oc Bottom phase	Williams silt loam — Ws
Pierce loam — Pl	Williams silty clay loam — Wc

CONVENTIONAL SIGNS

CULTURE
(Printed in black)

City or Village, Roads, Buildings, Wharves, Levees, Breakwaters, Levee, Lighthouse, Fort
Secondary roads and Trails
Railroads, Steam and Electric
Bridges, Ferry
R.R. crossings, Tunnel
Ford, Dam
School or Church, Cemeteries
Mine or Quarry Pit, Made land
Bluff, Escarpment Sand pit, Gravel pit, Triangulation station
Swamp and Gravelly areas
Soil boundaries
Boundary lines
Boundary lines
Boundary lines
U.S. township and section lines

RELIEF
(Printed in brown or black)

Contours, Depression contours
Prominent Hills, Mountain Peaks
Sand Wash, and Sand dunes
Shore and Low-water line, Sandbar

DRAINAGE
(Printed in blue)

Streams
Lakes, Ponds, Intermittent lakes
Intermittent streams
Sponge, Canals and Ditches, Flumes
Swamp, Salt marshes
Submerged marsh, Tidal flats

The above signs are in current use, but not all maps themselves from the areas represented in any series of earlier dates.

Thomas D. Rice, Inspector, District 3.
Soils surveyed by J. A. Machlis, South Dakota Agricultural Experiment Station, in charge, and B. H. Williams, U. S. Department of Agriculture.

Scale 1 inch = 1 mile
1 0 1 2 3 Miles

WILLIAMS & HUNTT CO., MASS., U.S.A.

Field Operations
Bureau of Soils
1925